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# REPORT

ON THE

## HAYCOCK IRON LOCATION.

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BY

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Consulting Mining Engineer.*

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# HAYCOCK IRON LOCATION.

Townships of Hull and Templeton, Province of Quebec.

## SKETCH PLAN.

and Section

By E.J. Chapman Ph. D.  
Professor of Mineralogy & Geology,  
in University College Toronto.  
and Consulting Mining Engineer,

April, 1873.

TEMPLETON, Lot 28 Range VI  
(North Half) Edw. Haycock.

Unexplored Ground.

MARSH.

Unexplored Ground.

HULL Lot. 1, Range XI.  
(North Half) Edw. Haycock.

TEMPLETON, Lot 28 Range VI.  
(South Half) Edw. Haycock.

Township Line, Site of Tramway  
to River Gattineau.



NNW.

S.S.E.

General Section taken roughly North and South  
through Eastern portion of the Location.

E.J. C. Del.

Copp, Clark & Co. Lith. Toronto.

# REPORT

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## HAYCOCK IRON LOCATION.

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TO EDWARD HAYCOCK, Esq., &c., &c.,  
OTTAWA.

SIR,—Having received your instructions to make an examination of your Mineral property in the vicinity of Ottawa, known as the HAYCOCK IRON LOCATION, and to furnish you with an impartial Report upon the same, including a general description of the property for public information, I visited the spot on the 16th and 17th of the present month (April, 1873): and I now beg to offer a condensed summary of the results of my observations. It will, of course, be understood that I cannot enter into many details, in consequence of the undeveloped state of the ground—a few irregular excavations only having been open as yet upon the property; but I was able to satisfy myself as to the presence, throughout the location generally, of a very large amount of iron ore, favourably situated for mining, and of more than average quality.

1. *Site and General Character of the Location*.—The property referred to in this Report under the name of the HAYCOCK IRON LOCATION, forms the north and south halves of lot 28 in the 6th range of Templeton, and the adjoining north half of lot 1 in the 11th range of Hull, in the Province of Quebec: the whole comprising an area of 300 acres, held in fee simple. As shewn in the accompanying sketch-plan,

these lots are separated by the township line, running very nearly north and south, and leading directly to the navigable portion of the River Gattineau. The latter is about six miles from the location, and it will be connected with it by means of a wooden tramway, the right to lay this along the township line having already been secured. At the termination of the tramway on the left bank of the Gattineau, an area of about 140 acres has also been secured for the erection of a wharf and various offices; and although it is at first intended to ship the ore from the location for furnace treatment to iron works in the United States, it will probably be found expedient at no distant day to erect furnaces at this spot for the reduction of the ore at home. As coal can be laid down at the spot in question for seven dollars, or less, per ton, a good profit ought to be realized if suitable furnaces were put up and properly handled. For the conversion of the ore into pig metal by the ordinary blast furnace, the average amount of coal would not exceed a ton and a half per ton of metal, and would probably be somewhat less than this; but from its comparative freedom from foreign matters, the ore would apparently yield very good results by the direct or bloomary process.

As regards surface features, it may be stated that the location is traversed in a general east and west direction by three roughly parallel but more or less broken ranges of high land, with intervening breadths of somewhat marshy ground; and it is covered, on the higher portions more especially, with an abundant growth of hard-wood and other timber. A few frame buildings for the accommodation of the miners have been put up on the southern slope of the ridge lying along the division line of the north and south halves of the Templeton Lot, and preparation is now being made for the erection of others. A blacksmith's forge and stable have also been put up on this portion of the property; and at the time of my visit, a steam-engine of 40-horse power, for preparing the rails and sleepers for the wooden tramway, and for other purposes connected generally with the opening of the mine, was on its way to the ground.

2. *Mineral Features*.—The Haycock Location is underlaid by micaceous and gneissoid strata belonging to the Laurentian series. These strata have a general north-east and south-west strike, and they dip towards the north-west at an average angle of about  $45^{\circ}$  or  $50^{\circ}$ , as shewn in the sketch-section attached to this Report. Outcrops of bands of iron ore, running parallel with the stratification, occur more or less throughout the property, and are especially numerous on the slopes of the ridge along the central line of the Templeton Lot. The strata here exhibit foldings and corrugations along their course, and thus it may happen that excavations opened on the face of the ridge, although at somewhat different levels, and therefore apparently on distinct beds of ore, may be really on the same bed. Apart, however, from this probability, four or five distinct beds of good width undoubtedly occur on the southern slope of this ridge alone, and another of workable dimensions and great general purity runs along the foot of the northern slope of the middle ridge, a breadth of low swampy ground intervening between the two ridges. The latter bed, from its general colour and aspect, is designated in the accompanying section as the "steel-ore" lode. As its analysis shews, it is almost free from intermixed rock-matter: and containing but the faintest traces of sulphur and phosphorus, it would yield a pig-metal admirably adapted for conversion into steel by the Bessemer process. This statement, however, will apply to the ore upon the property generally.

Some of these beds of ore appear to possess a thickness of a few inches only, although, where several narrow bands lie near together, they will probably be found to run together at lower depths, and so form a workable deposit. But many of the beds indicate a thickness of five or six feet; and a large mass of ore, in the form of a single block weighing upwards of four tons, has been taken out of one of these. Two or three hundred tons of ore of first class quality have also been taken out of a small excavation in the same bed at the foot of the principal ridge; and this bed has been traced, by openings upon it, throughout a continuous length of 300 feet.



It may be expected, however, that some of the ore deposits on this location will be found to offer breaks in their continuity, or to occur in more or less detached lenticular masses; but making due allowance for this, it does not admit, I think, of any reasonable doubt that a very large quantity of first-class workable ore occurs upon the property. It is not possible, in the present undeveloped state of the ground, to enter into definite calculations; but as an illustration of the really large amount of ore that may fairly be expected to be obtained, I may refer to the small portion of the lode from which the large block, mentioned above, was derived. Taking only the portion of the lode at present known to measure 300 feet in length, with an average thickness of five feet, and assuming these dimensions to continue unchanged to the moderate depth of 100 feet only, it follows that an amount of ore equal to 20,866 English tons would be obtained from this small corner, so to say, of the property alone. In this calculation, the average sp. gr. of the ore is assumed to equal 5.0.

3. *Nature and Composition of the Ore*.:—The ore of this location consists essentially of hematite or specular iron ore, but it contains a small amount of magnetic oxide and traces of graphite by which the normally red streak is rendered greyish-black and lustrous. It presents a dark steel-grey colour, and in many places a strongly-marked cleavable structure with the well-known cross striæ on the cleavage faces. Here and there, indeed, it occurs in large well-defined crystals, mostly combinations of the ordinary hematite rhombohedron with broadly developed basal planes and other hemi-hexagonal forms. The specific gravity of the average ore may be assumed to equal 5.0. Two pieces, free from visible rack matter, gave me respectively 5.181 and 5.116. As a rule, the ore is practically non-magnetic, but in places it exerts a feeble action on a delicately suspended needle, and shews slight polarity. This general want of magnetism, coupled with its dark streak and tabular crystallization, might lead to the inference that it was rather ilmenite than

hematite, or that it contained, at least, a large amount of titanitic acid. I have examined, however, three separate portions of the ore taken from different beds, and although I have found titanitic acid in each, the highest amount scarcely exceeds 3 per cent. The ore has also been analysed by Mr. Harrington of the Geological Survey of Canada, who states expressly that he detected no titanium in it, and likewise by Dr. Wuth of Pittsburg, who found in it only 0.87 per cent. of titanitic acid, and by Mr. Blodget Britten, who obtained from it 3.84 per cent. This general freedom from titanitic acid is corroborated by the high specific gravity of the ore, and by its comparatively easy solution in hydrochloric acid. If the solution be brought to the boiling point, however, it becomes turbid by the precipitation of a small quantity of titanitic acid. It need scarcely be observed that an amount of this kind, averaging certainly no more than two or three per cent., does not in any way affect the practical value of the ore.

The results of my analyses are given in the following tabular statement. No. 1 is the composition of a fragment of a crystal. No. 2 shews the composition of a piece of the so-called "steel-ore," from the middle ridge of the south half of lot 28, in the 6th range of Templeton; and No. 3 is the composition of the average ore as obtained from the south slope of the principal ridge on the same lot. It is this latter analysis which must, of course, be taken as the expression of the general quality of the ore.

	(1.)	(2.)	(3.)
Sesquioxide of Iron.....	89.80	88.08	85.45
Protoxide of Iron.....	7.06	6.86	5.24
Titanic Acid .....	2.34	3.17	2.12
Protoxide of Manganese .....	trace	0.24	0.15
Magnesia .....	0.22	0.13	0.17
Lime.....	trace	0.55	0.41
Phosphoric Acid.....	trace	0.16	0.13
Sulphur .....	trace	0.03	0.07
Graphite.....	0.43	0.35	0.28
Insol. Rock-matter .....	0.11	0.26	5.77
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Metallic Iron .....	{ In No. 1 = 68.34 per cent.		
	{ In No. 2 = 66.98    "		
	{ In No. 3 = 63.88    "		

Analyses 1 and 2 were made on small portions of selected ore for the purpose of ascertaining more especially the amount of titanitic acid. The percentage of iron which they shew is thus higher than the average yield of the ore. Analysis No. 3, on the other hand, represents the composition of the ore generally, with the average amount of rock-matter which it may fairly be assumed to carry. This intermixed rock-matter consists for the greater part of orthoclase feldspar (silica, alumina and potash), the quantity of free silica in the ore being exceedingly slight. Hence, in the furnace treatment of the ore, the loss of metal by slagging would be comparatively low, and very little flux would be required. If 60 per cent. metal be taken to represent the average furnace yield, five tons of ore would make three tons of first-quality pig-iron. Unless smelted at home, however, the ore, it is probable, would be rarely used alone, but would be chiefly in demand to mix with poorer or more phosphatic ores.

A cubic foot of the average ore will weigh about 311 lbs. Hence an English ton, of 2240 lbs., will consist of about  $7\frac{1}{4}$  cubic feet; and an American or Canadian ton, of 2000 lbs., will contain rather less than  $6\frac{1}{2}$  feet.

If blast furnaces for producing pig metal from this ore, used alone, were put up at the storing place on the Gattineau River, a ton of metal ought to be produced (either with charcoal or anthracite coal,) at a cost of under \$20. At the present price of iron this would leave a very large margin of profit. The cost of production with hardwood charcoal may be roughly estimated as follows:

Mining, hauling and breaking $1\frac{3}{4}$ tons of ore .....	\$3 00
Charcoal, 24 cwt., at 8c. the bushel of 18 lbs. ....	12 00
Limestone, Scrap Iron, &c., (say) .....	0 15
Labour and furnace expenses .....	4 50
	<hr/>
	\$19 55

If anthracite coal, at \$7 per ton, were used in place of charcoal, and the coal were of fair quality, the cost of production would be reduced to about \$18, but the value of the pig metal would probably be somewhat lower than that of the charcoal-produced iron.

As regards the development of these ore beds, I would recommend the first openings to be made on the south face of the principal ridge, and on the deposit of light-coloured ore at the north foot of the opposite ridge, as the latter deposit appears to be of quite exceptional purity. At the same time, exploratory lines should be carried in a general north and south direction, or across the strike of the strata, through the entire location, for the detection of other beds of ore. Nothing of this kind could be done at the period of my visit, as the snow still lay thickly upon the ground; but I am quite satisfied that other bands of similar ore must occur on the southern ridge, a portion of the property at present altogether unexplored. The value of the location as an iron property is sufficiently proved, however, by the quantity, richness, general purity, and accessibility of the beds of ore already discovered,

I have the honour to be,

Sir,

Your obedient servant,

E. J. CHAPMAN, PH. D., ETC.,

*Professor of Mineralogy and Geology in University College,  
Toronto, and Consulting Mining Engineer.*

TORONTO, April 25th, 1873.